

Apple II



# Apple Plot



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Apple II

# Apple Plot

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# CHAPTER 1

## GETTING STARTED

### WHAT YOU WILL NEED

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To use Apple Plot, you will need:

- \* An Apple II or Apple II Plus computer, with 48K of RAM memory;
- \* A Disk II disk controller and at least one Disk II disk drive;
- \* A black-and-white or color video monitor or television.

If you do not have an Apple II Plus, then you will need either

- \* An Applesoft II Firmware Card,  
-- OR --
- \* An Apple Language System and a BASICS: diskette.

In addition, it is helpful (but not necessary) to have:

- \* A printer, either the Apple Silentype Printer with its own interface card, or a Qume Sprint 5 with a Serial Interface card.
- \* Additional Disk II disk drives.

### ABOUT APPLE PLOT

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Apple Plot is a program which allows you to create, manipulate, display, and print graphs and charts. You specify the information (as coordinate pairs) which you wish to plot, and tell Apple Plot the format in which you want it to display the graph (a line graph, bar chart, scatter chart, etc.). You can edit and manipulate the resulting graph, add labels, change the scale, or add other data; when you've finished working with a graph, you can save the information about the data and format of the graph onto an Apple diskette, or get the graph printed out on paper.

Apple Plot is a very flexible program. It was constructed in such a way as to allow you to perform all sorts of manipulations on your data and format specifications. Sometimes when you're trying something

with Apple Plot which you haven't done before, you may run into strange circumstances in which Apple Plot will do something which you wouldn't ordinarily expect it to do. In cases like this, it is best to carefully check the information you've given Apple Plot, to see that it is correct and self-consistent. To help you with this, in this manual you will occasionally see this symbol:



It means that the next paragraph contains special information which will give you a helping hand. The symbol



means that the next paragraph describes something you should watch out for: an unusual feature of Apple Plot which could cause you to lose some work or data. The symbol



alerts you to be especially careful: the next paragraph describes a situation in Apple Plot which could cause to not only lose your data, but all control of Apple Plot as well. Read this paragraph carefully.

This manual uses CAPITAL LETTERS to represent the dialogue between you and Apple Plot. Words and numbers such as 5 RETURN in the text mean "type 5 and press the key marked RETURN." Words or phrases ON A LINE BY THEMSELVES describe single-line statements displayed by the Apple.

This manual uses the names of four special keys on the Apple's keyboard: RETURN, RESET, ESC, and CTRL. The first three words mean "press the key marked so," but CTRL- followed by a single letter means "hold down the CTRL key and type the following letter."

## STARTING UP

---

Before you begin to use Apple Plot, you should know a little about your Apple and its disk drive and operating system. Please read the manual which was supplied with your disk drive, specifically the sections which deal with unpacking and setup, care of the drive and diskettes, and booting the Disk Operating System (DOS).

Insert the Apple Plot diskette in the disk drive (Drive 1 if you have more than one) and boot the system as described in your DOS manual.

If you have an Apple Language System, then you must boot your system using the BASICS: diskette supplied with your Language System before you can boot the Apple Plot diskette. See the section "Using BASIC" in your Language System Manual.



In any case, after you boot your Apple Plot diskette, the screen should display the message

#### LOADING APPLEPLOT

If it does not, consult the DOS manual which came with your disk drive and try again.

## BACKING UP

---

If you're an experienced Apple user (or reader of Apple manuals), then you don't need to be told again about the necessity of making duplicate or "backup" copies of your diskettes. If you're not an experienced Apple user, then you should learn about the necessity of backing up. Refer to the manual which came with your disk drive, or the Disk Operating System (DOS) for details on how and why to backup your diskettes.

It's a good idea to keep Apple Plot on one diskette, and save your data files, slide show, and file converter on a separate, INITIALIZED diskette. That way, you can boot from the Apple Plot diskette, and keep your data separate on other diskettes, backed up, and without the storage constraints that arise when Apple Plot shares diskette space.

# CHAPTER 2

## USING APPLE PLOT

### APPLE PLOT IN ACTION

---

When Apple Plot has finished loading, it will greet you by displaying a title page and copyright notice. Press the spacebar to proceed.

Next, the Apple Plot Menu will appear:



The Apple Plot Menu shows you the nine basic operations of Apple Plot. To choose one of these operations, simply type the number associated with the operation and press the RETURN key. For example, type 7 to select the RECALL DATA FROM DISK operation. The title of the operation you've selected will appear at the bottom of the screen, with a request for verification. If this is indeed the operation you want to perform, press RETURN to proceed. If you change your mind, or you pressed a wrong key, then press the ESC key to cancel the operation and go back to the Apple Plot menu.

After each operation is finished, you will be returned to the Apple Plot menu. If you wanted to leave Apple Plot, you would return to the Apple Plot menu and press the Q (for Quit) key.

The Apple Plot diskette contains some sample data sets which demonstrate its features and capabilities. To load one of these data sets, start from the Apple Plot menu and press 7 RETURN to select RECALL DATA FROM DISK. You'll then be asked whether you want to recall Data or a Picture. The meaning of these terms will be explained later; for now, just type D to indicate Data and press RETURN.

Apple Plot will now show you a list of all the files on the diskette:



The files which contain Apple Plot data sets are denoted by the letter T to the left of their file names. The T means that they're Text files, one of the types of files used on Apple diskettes. All Apple Plot data sets are stored in Text files, though not all text files contain Apple Plot data sets.

Get the data set called SALES PLOT by typing the name and pressing RETURN. If you mistype the name, or specify a name which is not the name of a valid Apple Plot data set file, then the message CHECK YOUR INPUT will appear and you will be asked to respecify the name.

When you've successfully loaded the SALES PLOT data set, you will be returned to the Apple Plot menu.

## DISPLAYING A GRAPH

Now that you've loaded a data set, you can tell Apple Plot to plot it on the screen by typing 5 to select DISPLAY GRAPH and pressing RETURN. The following graph will be drawn:



Look carefully at this graph. Notice that the graph consists of twelve small squares and twelve small crosses. These squares and crosses are data points, and they represent the information that you've just loaded from the diskette. The set of all the data points represented by the squares is called a data list, and the set of all the data points represented by the crosses is another data list. A data list can contain up to 100 data points, and the two data lists together comprise a data set.

There are two graph lines on the screen. Each line connects all the data points in one data list. If you've got a color video monitor, then you'll notice that one line is drawn in white, the other in blue. If you've got a black-and-white television set or video monitor, the lines will appear as solid white and dashed grey.

The corner (origin) of the graph is in the lower left-hand corner. There are labels on the X-axis (horizontal) and Y-axis (vertical), as well as in the graph itself. There is also a title at the top of the screen. The Y-axis is divided into ten segments, numbered by hundreds; the X-axis is divided into twelve parts, each labelled with the initial of the name of a month. There are horizontal grid marks extending from the Y-axis. You can control or change each and every one of these features (called "parameters") to suit your needs.

Press the spacebar to return to the Apple Plot menu.

## GRAPH FORMATS

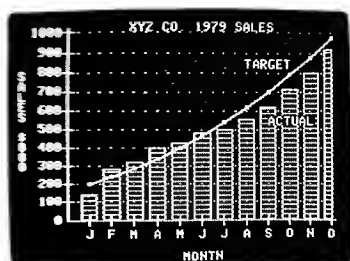
---

Type 1 to choose GRAPH FORMAT SELECTION and press RETURN. You'll be presented with another menu, called the Graph Format Selection menu:



The first six menu selections are the six formats in which you can display your data. Notice that format number 2, STANDARD GRAPH WITH GRAPH OVERLAY, is highlighted: it is the current choice. Type 4 to select GRAPH WITH BAR CHART OVERLAY and press RETURN. The highlighting will shift to indicate that format number 4, which you just chose, is now the current format. Press RETURN to get back to the Apple Plot menu.

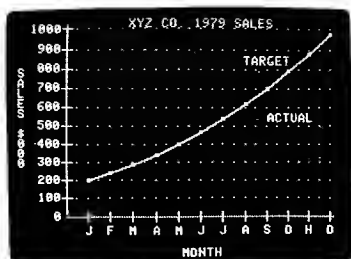
Now display the graph in its new format by typing 5 RETURN, as you did above. Here's what it should look like:



It's the same data, but plotted in a different format. The first data list is still the same as it was before, but the other data list (which was portrayed by a dashed blue or grey line in the previous example) is now shown as a bar chart.

(Notice that the last bar in the bar chart is only half as wide as the other bars. This is normal; Apple Plot doesn't have the space on the screen to draw a full-width bar there. See the section "Display Data" in Chapter 3 if you would like full-width bars.)

Press the spacebar to return to the Apple Plot menu. Press 1 RETURN again to go back to the Graph Format Selection menu, and change the format selection to 1, the STANDARD GRAPH. Return to the Apple Plot menu and DISPLAY GRAPH once again. This time you'll see just one data list:



Apple Plot hasn't forgotten the other data list, but you've told it to display only this one. You can display either one or two data lists, both line graphs or bar charts, or one of each.

There's also another way to display your data, called a scatter chart. Let's display the second data list in this format. Get back to the Graph Format Selection menu (by pressing pressing 1 RETURN from the Apple Plot menu) and press 7 to EXCHANGE PLOTS. This simply switches the two data lists, so that the graph formats which plot only one data list will plot the second list, rather than the first. The exchange may take a little time. While the Apple is working, it will display the message  
EXCHANGING PLOTS

flashing at the bottom of the screen. When it finishes, it will return you to the Apple Plot menu.

Now get back to the Graph Format Selection menu again and choose 6, the SCATTER CHART. Return to the Apple Plot menu and display this graph. It should look like this:



All that you see are the data points in the second data list and nothing else. If you hadn't exchanged the lists, you would have seen the data points for the first data list and nothing else.

Press the spacebar to return to the Apple Plot menu.

## DESIGNING YOUR OWN GRAPH

---

So far you've been using Apple Plot with a sample data set which was included on the Apple Plot diskette. Now you'll see how to create and format your own data sets.

From the Apple Plot menu, press 8 to choose CLEAR FOR NEW PLOT and press RETURN. Apple Plot will warn you that you are about to erase the information for the SALES PLOT graph. Since the information is still stored on the diskette (you haven't changed or removed it), and you want to start working on another data set, it's all right to lose the SALES PLOT data. Press the ESC key to clear the data. The message CLEARING

will flash on the screen for a few seconds, and you'll be returned to the Apple Plot menu.

Suppose that you have information about the daily closing prices of common stock for the Widget Corporation for the month of January, and you want to plot this data. You've got a table which looks like this:

<u>Day</u>	<u>Close Price</u>	<u>Day</u>	<u>Close Price</u>
1	60 1/4	16	65
2	60 1/2	17	63 11/2
3	60	18	62
4	60	19	(closed)
5	(closed)	20	(closed)
6	(closed)	21	54 (stock split)
7	62 1/2	22	54 1/2
8	63	23	54 1/4
9	64 1/4	24	54 .
10	65	25	53 1/2
11	64 3/4	26	(closed)
12	(closed)	27	(closed)
13	(closed)	28	57
14	65 1/8	29	57 3/4
15	65 1/4	30	58 1/2
		31	59

This is a simple graph; just one line through 23 data points. You'll use only one data list for this graph. The valuable things you'll need to tell the Apple are:

- \* the information (the number of the day and the stock's value for that day) for each data point in the data list;
- \* which data points in the data list you want to display;
- \* information about the format of the final graph, which includes titles, labels, etc.

You can specify this information in any order, and change it at any time. For clarity, let's enter the data first. From the Apple Plot menu, choose 4, DATA ENTRY AND EDITING, and press RETURN.

## DATA ENTRY

When you enter this section of Apple Plot, you'll see another menu, called the Data Entry and Editing menu:



From this menu, you have three choices. We'll exercise all of these choices in this section; first, select PLOTTING RANGE by typing 1 and pressing RETURN.

Apple Plot will ask you four questions about your data. After each question, Apple Plot will wait for you to type your reply to its question. It will also display a number after each question; if you answer any question by simply pressing RETURN, Apple Plot will assume that you want it to use the reply that it provided for you. This reply is called the default reply. You'll be using it a lot in Apple Plot; it's the easiest way to both see what the current values of important parameters are, and to change only a few values without having to retype everything.

The first two questions deal with the number of the first and last data points in your graph. You've got a total of 23 data points (not 31, because the market is closed on weekends). The first question is STARTING PT FOR PLOT #1:. Your starting data point will be number 1. Since you haven't entered any data points yet, Apple Plot has given you a default reply of 0; change this to the number you want by typing 1 and pressing RETURN. The next question is ENDING PT FOR PLOT #1; the default reply is again 0. Since you have 23 points, you should change this. Type 23 RETURN.

The next two questions deal with the second graph. Since you're only using one data list, you can ignore these values. Press RETURN twice to tell Apple Plot to use its default replies for these questions. Now that this task is complete, you'll be returned to the Data Entry and Editing menu.

Now it's time to enter the data. From the Data Entry and Editing menu, choose 2, DATA ENTRY, and press RETURN. You'll be asked which data list you want to work on; answer 1 RETURN to work on the data list for the Widget stock graph (you're not using the other one). Now you'll be placed into the Data Editor:



The Data Editor is a tool for entering, examining, and changing data points. Each data point has three parts:

- \* The NUMBER of the data point. There are 100 possible data points in each data list, numbered 1 through 100. Each data point has a unique number associated with it. When you display the graph, Apple Plot plots the data points one by one, in the order of their data point numbers.



- \* The X-VALUE of the data point. This number represents the position of the data point along the horizontal axis. An X-value may be any positive number of any magnitude, it does not need to be unique, and it need not be related in any way to the number of the data point.
- \* The Y-VALUE of the data point. This number represents the height of the data point along the vertical axis. This also may be a number of any magnitude, does not have to be unique, may be positive or negative, and does not need to have any relation to the number of the data point.

To enter a data point, all you have to do is type the number of the data point, the X-value of the data point, and the Y-value of the data point, all separated by presses of the RETURN key. In the Widget stock graph, the first data point is for the day January 1, when the value of the stock was 60 1/4, or 60.25 in decimal numbers. So you would type:

```
1 RETURN 1 RETURN 60.25 RETURN
```

As you enter each number and press RETURN, the number is placed in its appropriate column. Similarly, for the next few data points, type:

```
2 RETURN 2 RETURN 60.5 RETURN
3 RETURN 3 RETURN 60 RETURN
4 RETURN 4 RETURN 60 RETURN
```



If you entered any data item wrong, simply retype it in its entirety, beginning with the data point number. Apple Plot will substitute the new data for the old automatically. Don't try to use the Apple's backspace key to go back and correct mistakes; it won't work. If you find you've typed a data point wrong, just finish entering the point and then re-enter it the correct way.

You should have three columns, each containing four numbers:



Now since the stock market is closed on weekends, you have no data for the 5th and 6th of January, so your fifth data point will be the data

for January 7th:

5 RETURN 7 RETURN 62.5 RETURN

Here's the table of stock prices again. You've already entered the first five data points; now enter the remainder into the Apple Plot Data Editor.

<u>Point</u>	<u>Day</u>	<u>Price</u>	<u>Point</u>	<u>Day</u>	<u>Price</u>
1	1	60.25	12	16	65
2	2	60.5	13	17	63.5
3	3	60	14	18	62
4	4	60	15	21	54
5	7	62.5	16	22	54.5
6	8	63	17	23	54.25
7	9	64.25	18	24	54
8	10	65	19	25	53.5
9	11	64.75	20	28	57
10	14	65.125	21	29	57.75
11	15	65.25	22	30	58.5
			23	31	59

Your final data item should be:

23 RETURN 31 RETURN 59 RETURN

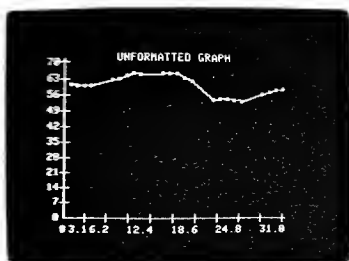
Now that you've finished entering the data, type a slash (/) followed by RETURN to go back to the Data Entry and Editing menu.

To look at the data you've entered, select 3, DISPLAY DATA, and press RETURN. Once again, you'll be asked which data list to use. Reply 1 RETURN. Apple Plot will start displaying the data points, one by one. If you have an Apple Silentype printer, then the data points will be printed on the Silentype, as well as on the screen. Only a portion of the screen is used to display data; when this portion is filled, the data point values start scrolling off the top and disappearing. You can tell Apple Plot to pause by pressing the spacebar; the display will hold as it is until you press the spacebar again.

After Apple Plot shows you data points numbered 1 through 23, it will continue displaying data points numbered 24 through 100, even though you didn't enter any data for those points. All data points to which you haven't assigned values automatically have both their X and Y values set to zero. Since you don't care about these values (in the PLOTTING RANGE section you said you were going to use only the first 23 points), you can stop the listing by pressing RETURN. You'll be returned to the Data Entry and Editing menu. Press RETURN again to return to the Apple Plot menu.

## A FIRST LOOK

Before you begin to construct the format for this graph, take a look at it. Choose 5 to **DISPLAY GRAPH** and press **RETURN**. Apple Plot will first scan your data list, to find the minimum and maximum values for both axes. Since this is the first time it's processed your data, it will display a frame telling you the minima and maxima it found, and adjust the scales of both axes to fit the data. Press the spacebar to display the graph. This is what you should see:



Notice how Apple Plot has constructed the graph. The title is "UNFORMATTED GRAPH" and the axes are labeled simply "X" and "Y". The range of the X-axis is from 0 to 31.0, with ten divisions. The range of the Y-axis is from 0 to 65.3, which is the largest Y-value in the data set. The Y-axis also has only ten divisions. There are no labels in the graph itself, and there are no grid lines extending from either axis.

This doesn't really look right, so let's make a specification for what the graph should look like. First, the title should be "WIDGET CORP. STOCK", the X-axis should be labeled "JANUARY", and the Y-axis should be labeled "STOCK PRICE". The X-axis should have 31 divisions, not 10, with dotted vertical lines extending from each grid mark. And since the Y-values are all between 54 and 66, and we would like the Y-axis to be ruled in even numbers (not strange decimals), the upper Y-limit should be 70, the lower limit should be 50, and there should be 10 divisions. Furthermore, it would be useful to have a label in the graph indicating the stock split on January 21. All of these formatting features are possible with Apple Plot.

## CHANGING X-AXIS PARAMETERS

If you're still looking at the graph, press the spacebar to get back to the Apple Plot menu. Now choose 2, **X-AXIS PARAMETERS**, and press **RETURN**. The X-AXIS PARAMETER section is like the **NUMBER OF DATA POINTS** section: not a menu, but a series of questions with default replies. If you make a mistake in answering a question, don't worry; you'll be given a chance to go back and fix mistakes after you finish

the list of questions.



Many of the questions ask you for numerical replies. If the number you type is too large for Apple Plot to use, then Apple Plot will instead use the largest number it can. It will not tell you that it is not using the number you typed. The situation is similar for numbers too small for Apple Plot to use: it will use the smallest value it can. You can see if Apple Plot has changed any of your values by going through the list of X-AXIS PARAMETER questions again, after you finish setting all the parameters.

The first few questions concern the number and range of divisions along the X-axis. REMEMBER: this has nothing to do with the number of data points you have! In the examples you've seen, there has been one X-division for each data point, but this is not necessary. You can have as many as 100 data points, and as many as 31 divisions of the X-axis, with any range you choose, as long as the maximum X-value in the X-AXIS PARAMETERS is greater than or equal to the largest X- value in your data set.

First, Apple Plot asks you if this is a monthly plot. Since the X-values in your graph are days, not months, you should answer NO to this question. In anticipation of your negative response, Apple Plot has supplied a default reply of N. To accept its answer, simply press RETURN.

The next question is similar, asking you if your plot is a yearly one. Once again, the default response is the proper one. Press RETURN. (Monthly and Yearly plots are discussed in Chapter 3).

The next question asks you for the number of divisions along the X-axis. The number of divisions specifies how many tic marks there will be on the X-axis. Since you want one tic mark for each day of the month, answer 31 RETURN.

Next, you'll be asked about the maximum X-axis value, which is the value of the extreme right-hand tic mark along the X-axis. When you entered the data (above), Apple Plot took the largest X-value in your data set to be the maximum X-axis value, and that's why 31 is the default reply. You can increase this value if you wish, but you can never decrease it below the maximum X-value in your data set. (If you do, Apple Plot will automatically adjust it the next time you display the graph.) For now, accept the default reply by pressing RETURN.

The next question is about the minimum X-axis value. Apple Plot has set this to zero.



NOTE: The minimum X-axis value is not the value assigned to the first tic mark, but the value of the origin (the point of intersection of the X-axis and the Y). Thus, if you want the data point with the

smallest X-value to fall directly above the first tic mark (as you do in this graph), you should set the minimum X-axis value to be less than the value you want assigned to the first tic mark. For example, in the Widget stock graph each tic mark represents one day, and the first tic mark is day 1. Therefore the minimum X-axis value should be 1 less than 1, which is zero.

An easy way to remember this is to subtract the minimum X-axis value from the maximum X-axis value. The difference of the two should be an even multiple of the number of X-axis divisions.

Since the default setting for the minimum X-axis value is the value you want, accept it by pressing RETURN.

Next, you'll be asked some questions about the labels on this graph. Apple Plot will first ask you about the label of the X-axis. The default for this is simply "X", but you can change this to "JANUARY" by typing the word itself and pressing RETURN.

You can have up to two additional labels. These labels are different from the labels on the X- and Y-axes in that they are allowed to "float" anywhere in the graph: you decide where to position them when you display the graph. Since you want to label the stock split on January 20, use floating label #1 to do this.

When Apple Plot asks you, USE LABEL #1 ?, answer Y (for YES) RETURN. The next question is CHANGE LABEL #1 ?. Since the default label is blank, you should change this label. Answer Y RETURN again. Apple Plot will respond by displaying the current text of label #1, and asking you CHANGE TO :. Type SPLIT -> and press RETURN. The hyphen and right caret (->) make an arrow which will point to the data point on the graph where the stock actually split. You'll position the label later, when you display the graph.

After you define label #1, you'll be asked if you want to use label #2. Since you don't need another label, accept the default NO reply by pressing RETURN.

Apple Plot will now ask you if you want EXTENDED VERTICAL GRID LINES. These are dotted lines extending up from each X-axis tic mark. Answer Y RETURN to use these in your graph.

The final question for the X-AXIS PARAMETERS is ANY CHANGES (Y/N) ?. This is your chance to go back and fix anything you may have mistyped. If you answer Y RETURN, you'll begin the series of questions again. All the replies you just entered will be the new default replies. This lets you review all you've done by simply pressing RETURN for every question.

If you answer N RETURN (or simply RETURN), you'll be returned to the Apple Plot menu.

## Y-AXIS PARAMETERS

---

Now that you've specified the format for the X-axis, it's time to format the Y-axis. From the Apple Plot menu, select 3, Y-AXIS PARAMETERS, and press RETURN. This is another set of questions, similar to the list for X-AXIS PARAMETERS. Again, if you give Apple Plot a number for a Y-AXIS PARAMETER which is too large or too small for it to use, it will use the largest or smallest number it can for that parameter, without notifying you of the change.

The first question concerns the number of divisions along the Y-axis. In the specification for this graph, it was decided that there should be ten divisions on this axis. Coincidentally, this is the default value! Accept the default value by pressing RETURN.

The next two questions Apple Plot will ask you concern the maximum and minimum Y-axis values. These are the values you want Apple Plot to assign to the top tic mark and the origin, respectively. In the specification for this graph, it was decided that the Y-axis should range from 50 to 70, so enter 70 RETURN for the maximum Y-value and 50 RETURN for the minimum value.

Next, you'll be asked to enter the label for the Y-axis. Since the Y-axis is the "STOCK PRICE", type this label and press RETURN.

In the next question, Apple Plot asks you the title for this graph. Since this is no longer an "UNFORMATTED GRAPH", type WIDGET CORP. STOCK and press RETURN.

Apple Plot will then ask you whether you wish to have EXTENDED HORIZONTAL GRID LINES. These are just like the EXTENDED VERTICAL GRID LINES on the X axis; since the specification indicated only vertical lines, you don't need the horizontal ones. Since the default reply is NO, accept this reply by pressing RETURN.

The final question for the Y-AXIS PARAMETERS is ANY CHANGES (Y/N) ?. This is your chance to go back and fix anything you may have mistyped. If you answer Y RETURN, you'll begin the series of questions again. All the replies you just entered will be the new default replies. This lets you review all you've done by simply pressing RETURN for every question.

If you answer N RETURN (or simply RETURN), you'll be returned to the Apple Plot menu.

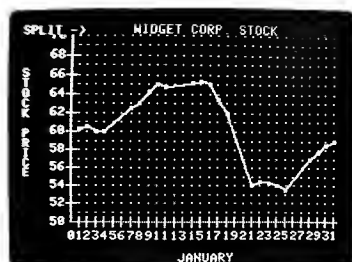
## A SECOND LOOK

---

One more thing left to do: choose 1 for GRAPH FORMAT SELECTION and press RETURN. From the Graph Format menu, choose 1, STANDARD GRAPH

(since you have only one data list), and press RETURN once, then again, and you'll be back at the Apple Plot menu.

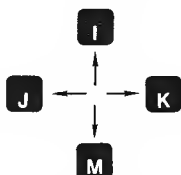
Now choose 5 to DISPLAY the GRAPH and press RETURN. This is what it should look like:



It has everything the specification ordered: the X-axis labeled JANUARY and ruled from 1 to 31; the Y-axis labeled STOCK PRICE and ruled from 50 to 70 in ten divisions; vertical lines extending up from the X-axis, and entitled WIDGET CORP. STOCK.

There's only one thing wrong: the label, SPLIT ->, which was meant to point to the stock split on the graph, is instead nestled in the upper left-hand corner. You need to position it.

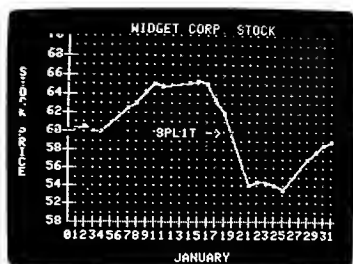
Look at these four keys on your Apple's keyboard:



You will use these four keys to move the label around the screen. Press the letter K. The label will disappear and reappear a bit to the right. Press it again; it moves further right. Press M and the label will move down. The I key will move the label up, and J will move the label left. (These are the same four keys which control cursor movements in ESCape mode if you've got an Autostart ROM). When you move the label around, it will erase parts of the graph as it moves across them. Not to worry, you can restore the full graph later.

Using these four keys, move the label so that it's near the downslope

on the graph which indicates the fall in the stock's price when it split:



That's good, but not great; it would look better if it were a little closer to the graph. Type a CTRL-A. Now try to move the label around using the same four keys as above. The label still moves the proper directions, but it moves in much smaller increments. You can use this "fine tuning" to place the label precisely where you want it. If you want to go back to the "coarse tuning", type a CTRL-S.

When the label is right on target, press RETURN. The Apple will beep, indicating that you've fixed the label at its current position. Once you position a label, you won't have to reposition it unless you change the text of the label (in X-AXIS PARAMETERS).

If you had used the second label, you would have positioned it in exactly the same manner as you did the first. Once the label(s) are in place, press the spacebar to return to the Apple Plot menu, and, if you like, you can display the graph again to see how it looks in its finished form.

## SAVING YOUR WORK

---

You've spent a bit of time entering all the data for this graph, and a little more specifying the format. But if you turn the Apple off now, or start running another program, or even try another Apple Plot example, you'll lose all the work you've done up to this point. For this reason you'll probably want to save this graph onto the diskette, either to experiment with later or to remind you what the various parameters do. Even if you don't want to save this particular graph, you'll certainly want to save others you will create with Apple Plot.



SAVE DATA TO DISK  
(PRESS RTN FOR MENU)

DATA / PICTURE?

<D / P> ■

(USE X,0# FOR ALT DRIVE. E.G. D,02)

Select D for Data and press RETURN. Apple Plot will then display the contents of the diskette:

```

DATA TO DISK
(PRESS RETURN FOR MENU)
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T3 008
T4 008
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T7 008
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Once your data set is saved on the diskette, it will remain there. You can call it back at any time, modify it if you like, and resave it; remember that none of the changes that you make to the data or the format will become permanent until you save the data set onto the diskette.

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files are sequential-access Text files and the format of these files is described in Chapter 4 of this manual.



When you SAVE DATA TO DISKETTE, if you type the name of a file which is already on the diskette, the information that was in that file will be lost and the new data will replace it.

## PRINTING A GRAPH

---

If you have either an Apple Silentype or a Qume Sprint 5 printer attached to your Apple, then you can get a printed "hard-copy" of your graph. Once you have properly formatted your graph and you have had it displayed on the screen, select 9, PRINT GRAPH, from the Apple Plot menu and press RETURN. You'll be shown the Printer menu:



The interface card for the printer (either a Silentype card for that printer or a Serial Interface card for a Qume Sprint 5) should be plugged into slot 1 in the back of the Apple. (For more information on how to connect and set up your printer, refer to the manual which came with your printer or interface card.) Make sure that you have turned on the power to your printer and it is ready to go, then press either 1 or 2 to select the SILENTYPE or the QUME printer and press RETURN.

If you selected the Silentype printer, and the proper printer card is not installed in your system, you will be told  
SILENTYPE NOT IN SYSTEM  
Press the spacebar to return to the Apple Plot menu.

If your Silentype is present and operational, Apple Plot will ask you whether you wish to CHANGE PRINTER PARAMETERS? (Y/N). Press N RETURN and the Silentype will print your graph.

If you chose the Qume printer, your graph will be printed on the Qume without further questions. Make sure that your printer is connected, turned on, and supplied with paper and ribbon before you select it from the Printer menu.

Once the printer has finished printing your graph, you will be

returned to the Apple Plot menu.

## LEAVING APPLE PLOT

---

When you end your session with Apple Plot and you want to use your Apple for another purpose, return to the Apple Plot menu and press Q. When you leave Apple Plot, you will lose all data you were working with. To keep you from accidentally abandoning important information, Apple Plot will remind you to save your data before you go. If you want to go back and save your data, if you want to keep using Apple Plot, or if you didn't intend to leave Apple Plot and you hit Q accidentally, you can get back to the Apple Plot menu by pressing RETURN. If you've already saved your data, or do not wish to do so, and are really serious about leaving, press ESC. In a flash you'll find yourself free to use your Apple as you will.

## MOVING ON

---

If you've done everything that this manual describes up to this point, then you should have a good feel for what Apple Plot can do and how to make it do it. But Apple Plot has still more features for you to use: these are explained in full detail in the next chapter. Chapter 3 is a little different from this one. It is mostly facts and information, and contains little of the step-by-step instruction you've found in this chapter. It introduces all the features of Apple Plot in the order in which they appear in the program, not necessarily in the order in which you'll use them, with only a few short examples.

In short, it is a reference chapter, one to refer to if you want to learn more about how Apple Plot works. The best way to learn the other features of Apple Plot is to use them. If you take an hour and experiment with Apple Plot, loading the various sample data sets on the diskette and playing with them, exercising as many features as you can, then you'll soon become an expert Apple Plotter. Your graphs will be more attractive and functional. It is your skill and technique which will make Apple Plot a powerful addition to your Apple library.

## TECHNIQUE TIPS

---

On the subject of technique, here are a few techniques that are helpful to the efficient use of Apple Plot:

- \* Enter the data first, then specify the format. Although you can do these in any order, you can let Apple Plot determine the limits of your data and attempt to plot it in the default format, and then you can look at what's wrong with the default format and start making up the final format from that.

- \* Don't use too many subdivisions on the axes. Any more than about 15 divisions on the X-axis, or 20 on the Y, cause the labels to come too close together and lose meaning. The graph of your data will still be the same if you use fewer divisions, but the labels will be more easily understood.
- \* If you have a standard graph format that you use often (as for a weekly sales report), keep a formatted graph with no data on the diskette. Then every week you can recall the format, add this week's data, plot it, and save the result under a distinct name. All of the graphs will have exactly the same format, and you don't have to start from scratch each week.
- \* If you need more than a one-line title for your graph, you can use one or both of the floating labels as additions to the title. Just position them immediately below the title.
- \* If you have an Apple Graphics Tablet or another device to let you edit and draw on Apple high-resolution screens, here's a neat trick to make custom graphs. Construct a formatted graph with no data, plot it, and save it in both formatted and picture forms (under different names). Then, using the Graphics Tablet or similar device, add your company's logo or other decorative device to the picture of the dataless graph. Save this picture on the diskette, rerun Apple Plot, recall the modified picture data, and set the GRAPH FORMAT's switch for OVERLAYS to ON. Now recall the formatted data set and add your data. When you plot it, your final graph will appear with your corporate logo in the background!
- \* When using Bar Charts, Apple plot will plot one bar at each tic. So, the first data point appears as a bar at the first tic, the second data point at the second tic, and so on. Therefore, be careful to set the number of points in the plotting range equal to the number of x-axis divisions, when you're using bar charts. Otherwise, Apple Plot will automatically reset the plotting range for you, with surprising results. For example, if you have 100 data points and 10 x-axis tic marks, the bar graph will only show the first 10 of your 100 data points, one bar at each tic mark. So be careful with bars!

## CHAPTER 3

# APPLE PLOT REFERENCE

## GENERAL NOTES

---

Apple Plot is composed of two main types of items: menus and question lists. There are four important menus: the Apple Plot menu, the Graph Format Selection menu, the Data Entry and Editing menu, and the Printer menu. In all of these menus, you indicate your selection by typing the digit associated with your choice. Apple Plot will display the name of your choice at the bottom of the screen and ask for confirmation. To confirm your selection, press RETURN. To cancel your selection, press any other key.

Each menu will tell you the name of the key to press to return to the previous menu. This is usually RETURN, often abbreviated "RTN". From the Apple Plot menu, a press of the Q key will let you leave Apple Plot.

## DEFAULTS AND SLASHES

The X- and Y-AXIS PARAMETER routines, the NUMBER OF DATA POINTS routine, and the GRAPH COLOR routine all are lists of questions. After many of the questions asked in these routines, Apple Plot will display a possible reply. This is called the default reply. If you press RETURN in response to a question which has a default reply, Apple Plot will assume that you mean to use the default reply. If you type a response to the question and press RETURN, Apple Plot will forget the default reply, and the reply you entered will become the new default reply for that question.

Typing a slash and pressing RETURN in response to a question will cause Apple Plot to use the default reply for that question and all following questions in the list, and return you immediately to the most previous menu. This is the method to use to avoid answering the remainder of a long list of questions.

## NUMBERS

When you indicate your choice from a menu, Apple Plot will accept only a single digit. When you answer any question regarding data point numbers or quantities, use only positive integers from 0 to 100. When you are specifying which data list with which you wish to work, use only the digits 1 and 2.

When you specify the number of divisions along an axis, you should use positive integers between 1 and 30 for the Y-axis, or between 1 and 31 for the X-axis. When you specify the minimum or maximum X- or Y-axis value, or any X-value for a data point, you may use any positive real number which Applesoft will accept; when you specify the Y-value of a data point, you may use a positive or negative real number. See the syntactic definition for "real" in Chapter 2 of the Applesoft II BASIC Programming Reference Manual.



Most X- and Y-axis parameters have other limits for the range of values which they will accept. Apple Plot will allow you to enter numbers outside these limits; if you do, it will ignore the number you entered and use the closest legal value it can. It will not tell you when you have entered a number which is out of range. To see if Apple Plot has changed any values you entered to keep them within its limits, you should check all parameters after you enter them.

## APPLE PLOT MENU

---

From the Apple Plot menu, you can choose one of the nine following menus or routines:

1. Graph Format Selection
2. X-Axis Parameters
3. Y-Axis Parameters
4. Data Entry and Editing
5. Display Graph
6. Save Data to Disk
7. Recall Data from Disk
8. Clear for New Plot
9. Print the Graph

These nine selections will be described in detail in the following sections.

To leave Apple Plot from the Apple Plot menu, press Q. Apple Plot will ask you to confirm your choice; to do so, press ESC. To cancel the choice, press RETURN.

To reenter Apple Plot after having left it, type  
RUN HELLO

## GRAPH FORMAT SELECTION

---

The Graph Format Selection menu has nine choices:

1. Standard Graph
2. Standard Graph with Graph Overlay

3. Bar Chart
4. Graph with Bar Chart Overlay
5. Multiple Bar Chart
6. Scatter Chart
7. Exchange Plots
8. Change Color of Graphs
9. Overlay Additional Graphs (on/off)

The first six options let you choose the form of your graph. The current format for the graph is shown by inverse highlighting on the selection number.

## THE SIX GRAPH FORMATS

Selection 1, the Standard Graph, is a graph of data list 1, plotted as white squares and connected by a white line. Selection 2, Standard Graph with Graph Overlay, adds data list 2, plotted as white crosses connected by blue lines, to the Standard Graph.

Selection 3, Bar Chart, will make Apple Plot display data list 1 as a series of solid white rectangles, the bases of which are on the X-axis and the tops of which are at the level of each data point.

Selection 4 plots data list 1 as white squares connected by a white line and data list 2 as a series of open white rectangles with horizontal blue crosshatching.

Selection 5 plots data list 1 as a solid white bar chart and data list 2 as a open bar chart with blue crosshatching.



When you are using selections 3, 4, or 5, each data point in the bar chart(s) must fall exactly above a division of the X-axis. Bar charts will malfunction if the data points fall between divisions of the X-axis. There cannot be more X-values in the data set than there are divisions along the X-axis. Also, the bar for the data point with the smallest X-value in the data set will always be placed on the leftmost tic mark, regardless of the scaling or labeling of the X-axis.

Selection 6, the Scatter Chart, plots data list 1 as a series of white squares with no connecting line.

## EXCHANGE PLOTS

Selection 7, Exchange Plots, physically exchanges the coordinate data of the two data lists. The data which was in data list 1 is now in data list 2, and vice versa. Apple Plot will display the message EXCHANGING PLOTS

flashing at the bottom of the screen while it is working.



EXCHANGE PLOTS does not exchange the PLOTTING RANGES of the two data lists. You must do this yourself in DATA ENTRY AND EDITING.

## CHANGING COLORS

Selection 8 lets you specify colors other than blue and white for your graphs. The GRAPH COLOR routine is a list of two questions, both with default replies. The color names and their associated values are displayed at the bottom of the screen. To change the color in which a data list is plotted, just type the number of the new color and press RETURN.

On a black-and-white television or video monitor, white shows up as a solid white line and all other colors (save black) show up as dashed grey lines of equal intensity. You cannot distinguish green from blue from orange from violet on a black-and-white display.

The color black is only useful when you are using bar charts.

## OVERLAYING GRAPHS

Selection 9, Overlay Additional Graphs, allows you to plot more than two data lists on the same graph. This function has two states, ON and OFF. The current state is indicated by reverse highlighting. When you choose selection 9, the state changes, from ON to OFF or vice versa.

When you turn the Overlay Additional Graphs switch ON, then all subsequent graphs you plot will be displayed as data graphs and floating labels only, without axes, axis labels, or titles.

To plot four data lists on the same graph, for example, you would enter the first two lists on one graph, format it, plot it, and save it to the diskette in both Data and Picture forms. Then you would turn the Overlay switch ON, and using the same graph format, enter the data for the next two data lists. You might change the color of these plots so you can tell them apart from the first two. Now when you display the graph, the two new data lists will be plotted on top of the graph of the last two data lists.

If you make a mistake when plotting the second pair of data lists, just recall the Picture of the first data lists, fix the problems, and plot the graph again.

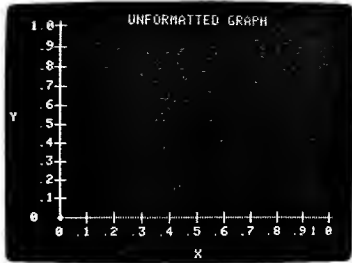
You can use the overlay function to give you more floating labels, let you use multiple scatter charts, or overlay many bar charts and standard graphs. When overlaying standard graphs and bar charts, it is advisable to plot the bar charts first.



# THE UNFORMATTED GRAPH

---

This is a photo of an Apple Plot graph with no data, and all parameters set to their default values:



## X-AXIS PARAMETERS

---

The X-AXIS PARAMETERS routine is a list of questions, most of which have default replies. These questions pertain to the limits, range, and labeling of the X-axis.

### MONTHLY PLOTS

The first question is IS THIS A MONTHLY PLOT?. If you answer NO, Apple Plot will skip to the Yearly Plot question (see next page). If you answer YES, you will be asked for the NUMBER OF FIRST MONTH and NUMBER OF MONTHS. The number of the first month should be an integer from 1 to 12, inclusive. It specifies the label for the first tic mark on the X-axis:

<u>Number</u>	<u>Initial</u>	<u>Name</u>	<u>Number</u>	<u>Initial</u>	<u>Name</u>
1	J	January	7	J	July
2	F	February	8	A	August
3	M	March	9	S	September
4	A	April	10	O	October
5	M	May	11	N	November
6	J	June	12	D	December

The first tic mark on the X-axis will be labeled with the initial of the indicated month and all successive tic marks will be labeled with the initials of successive months.



When you are doing Monthly plots, Apple Plot automatically sets the value of the origin to 0 and the value of the rightmost tic mark to the maximum X-value in your data set. All data points will be plotted in relation to these values, but the actual values of the tic marks will not be displayed. The NUMBER OF FIRST MONTH and NUMBER OF MONTHS are for labeling purposes only; they have no relation to the X-values of the data whatsoever. No matter how you manipulate these two variables, it will not change the position or appearance of the graph, only that of the X-axis tic marks and their labels.

The NUMBER OF MONTHS is the number of tic marks along the X-axis. This can be any integer from 1 to 31, inclusive. Again, this has no effect on the graph itself, only on the appearance of the X-axis.

## YEARLY PLOTS

If you replied NO to the Monthly Plot question, then Apple Plot will ask you IS THIS A YEARLY PLOT?. Again, if you answer NO, Apple Plot will skip the next two questions. See the next section, NUMERICAL PLOTS, below.

If you answer YES, then you will be asked to type the BEGINNING YEAR for the plot. This should be a number from 0 to 99. This number will be the label for the origin, not the first tic mark, on the X-axis. The next question is ENDING YEAR?. Enter a number from 0 to 99. Apple Plot will calculate the number of divisions automatically. NOTE: Because of labeling requirements, you can have no more than 12 years in a Yearly plot.

As in Monthly plots, the BEGINNING and ENDING YEAR settings have no effect upon the position or appearance of the graphs. The value of the origin is that of the minimum X-value in your data set; the value of the rightmost tic mark is that of the maximum X-value in the data set. All data points will be plotted in relation to these values. The quantity, spacing, and labeling of the tic marks are independent of the X-values.

It is acceptable for the ENDING YEAR to be less than the BEGINNING YEAR, as in the case of a plot from 1995 to 2005. This will give you ten divisions (and the origin) labeled '95 through '05.

## NUMERICAL PLOTS

If you answered NO to both the Monthly and Yearly plot questions, then Apple Plot will ask you three questions regarding the numerical range of the X-axis. The first question is NUMBER OF X-AXIS DIVISIONS?. This is the number of tic marks on the X-axis; this must be a positive integer between 1 and 31.

The next question is MAXIMUM X-VALUE?. This is the X-value assigned to the rightmost tic mark. This can be any positive real number; if it contains a decimal point, Apple Plot will display only two digits to the left of the decimal point.

The next question is MINIMUM X-VALUE?. This is the X-value assigned not to the first tic mark, but to the origin (where the Y-axis meets the X). This also may be any positive real number. The minimum X-axis value must be less than the maximum X-axis value.

For numerical plots (as opposed to Monthly and Yearly plots, discussed above), the data points are plotted in relation to the X-axis values. If the maximum X-axis value is larger than the largest X-value in the data set, then there will be extra space at the right edge of the graph. If the maximum X-axis value is smaller than one of the X-values in the data set, then Apple Plot will automatically increase the maximum X-axis value to accommodate all of the data points next time you display the graph. Apple Plot handles the setting of the minimum X-axis value in a similar manner.

## A WARNING



You have the responsibility to make sure that the number of tic marks along the X-axis, the minimum and maximum X-values, the total number of X-values in your data set, and the settings for Monthly, Yearly, and Numerical plots are all coordinated. It's very easy to miscount the number of data points or X-values in a data set: for example, a data set containing X-values ranging from 5 through 10, by ones, contains not five X-values, but actually six. If you're using bar charts with such a data set, and you set the number of divisions to 5, then the bar charts will not be plotted correctly.

Problems coordinating parameters and modes are manifested most often when you DISPLAY the GRAPH. If Apple Plot stops suddenly right after it has drawn the axes, and right before it labels the X-axis or plots the first data point, you can be fairly sure that Apple Plot found some inconsistency in your X-axis parameters (which is the most likely place for inconsistencies to creep in). If this happens, SAVE YOUR DATA IMMEDIATELY. Then investigate. Data sets may be lost by neglecting to save data before experimenting with the x-axis parameters.

Problems also crop up when you attempt to plot only a portion of a data set. Again, make sure that the number distinct X-values you're plotting is the same as the number of tic marks along the X-axis. Make sure that the PLOTTING RANGE is set correctly. In general, check and double-check everything, and if it still doesn't work, try changing a few parameters. If you save your data before you start experimenting, you can't lose anything.

## LABELS

The next question (regardless of the nature of the X-axis format) is X-AXIS LABEL?. The label can be composed of letters, numbers, or special symbols. It will be centered under the X-axis. Only the first 34 characters of the label will be printed; if the label is longer than this, the extra characters will be ignored.

There is no way to have a blank label; the label must have at least one non-space character. Leading spaces will be ignored.

The next several questions concern the two floating labels. The first question in the series is USE LABEL #1?. If you answer YES, then you will be asked CHANGE LABEL #1?. If you again respond YES, then Apple Plot will display the current text of this label and ask CHANGE TO:. Press RETURN to keep the current text, or type the new text for the label (up to 38 characters) and press RETURN. When you change the text of a label, the next time that you display the graph you will be allowed to reposition the label. See the section on DISPLAY GRAPH in this chapter for details.

When you have answered the questions for label #1, you will be asked a similar series of questions for label #2. Both labels operate in exactly the same manner and are interchangeable and independent.

The next question is whether you wish to have EXTENDED VERTICAL GRID LINES?. These are dotted lines extending up from each X-axis tic mark, with the dots in the line falling on and between the Y-axis tic marks. Answer Y or N.

The last question is ANY CHANGES?. The default reply is NO; this will return you to the Apple Plot menu. A reply of YES will send you back to the first question in the list again.

## Y-AXIS PARAMETERS

---

The Y-AXIS PARAMETERS routine, like its X-axis counterpart, is a list of questions, most of which have default replies. These questions pertain to the limits, range, and labeling of the Y-axis.

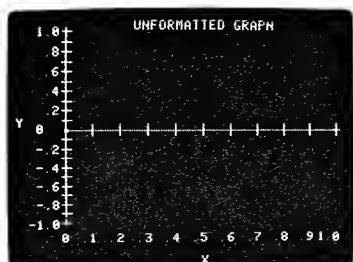
The first question is NUMBER OF DIVISIONS?. This is the number of tic marks (not including the origin) on the Y-axis. This should be a positive integer from 1 to 30.

The next question is MAXIMUM Y-AXIS VALUE?. This is the value which will be associated with the uppermost tic mark on the Y-axis; it can be any positive real number. The data points are plotted in relation to the Y-axis values. If the maximum Y-axis value is larger than the largest Y-value in the data set, then there will be extra space at the top of the graph. If the maximum Y-axis value is smaller than one of the Y-values in the data set, then Apple Plot will automatically increase the maximum Y-axis value to accommodate all of the data

Next, you will be asked about the MINIMUM Y-AXIS VALUE?. This is the value which will be assigned to the origin (where the X-axis meets the Y-axis). This can be any positive real number. If the minimum Y-axis value is smaller than the smallest Y-value in the data set, then there will be extra space at the bottom of the graph. If one of the Y-values in the data set is smaller than the minimum Y-axis value, then Apple Plot will automatically decrease the minimum Y-axis value to accommodate all of the data points.

## NEGATIVE PLOTS

The minimum Y-axis value should be a positive number. If your data set contains negative numbers, then Apple Plot will automatically display your graph in a format like this:



Notice that the X-axis bisects the Y and runs across the middle of the screen. In a positive/negative plot like this, the top tic mark on the Y-axis has the value of the maximum Y-axis value and the bottom tic mark on the Y-axis has the value of the negative of the maximum Y-axis value. The value of the X-axis will always be zero in a plot such as this. In a positive/negative plot, therefore, the minimum Y-axis value is irrelevant, and should be set to zero.

Also, in a positive/negative plot, the number of tic marks is doubled, so that there is an equal number of tic marks above and below the X-axis.

## LABELS

The next question is Y-AXIS LABEL?. The label can contain up to 19 characters: additional characters will be ignored. The label can be composed of letters, numbers, or special symbols. It will be displayed vertically, centered alongside the Y-axis. There is no way to have a blank label; the label must have at least one non-space character. Leading spaces will be ignored.

Next, you will be asked to specify the TITLE OF THIS GRAPH. Press RETURN to accept the current title; otherwise type the new title and press RETURN. The title can contain up to 32 characters: additional characters will be ignored. It can be composed of letters, numbers, or special symbols. The title will be displayed at the top of the screen (above the topmost Y-axis tic mark) and will be centered on the screen.

The next question is whether you wish to have EXTENDED HORIZONTAL GRID LINES?. These are dotted lines extending across from each Y-axis tic mark, with the dots in the line falling on and between the X-axis tic marks. Answer Y or N.

The last question is ANY CHANGES?. The default reply is NO; this will return you to the Apple Plot menu. A reply of YES will send you back to the first question in the list again.

## DATA ENTRY AND EDITING

---

The Data Entry and Editing menu has three alternatives:

1. Plotting Range
2. Data Entry
3. Display Data

To return to the Apple Plot menu, press RETURN.

### PLOTTING RANGE

This routine asks four questions, all of which have default replies. These questions let you tell Apple Plot which data points in each data list it should use in plotting your graph.



The numbers you will be using refer to the numbers of the data points in the data lists. They have no relation whatsoever to the X- or Y-values of the data.

The first two questions concern the STARTING POINT and ENDING POINT FOR PLOT #1. When Apple Plot plots the graph of a data list, it starts with the point you specify for the STARTING POINT and plots consecutive data points until it has plotted the ENDING POINT. Usually, the STARTING POINT is 1 and the ENDING POINT is the number of the last data point in the list, but they can each be any positive integer, from 1 through 100. The ENDING POINT should not be less than the STARTING POINT; if you try to set it so, Apple Plot will set it equal to the STARTING POINT.

For example, in the WIDGET STOCK graph you constructed in the last

chapter, you'd like to see a close-up of the two weeks from January 14 through January 25. By looking at the data you entered, you'll see that the data point number for the first day of the period you're interested in is number 10, and the data point for the last day is number 19. Set the STARTING POINT to 10 and the ENDING POINT to 19 and plot the graph. You'll see something like this:



Only a subset of the data list will appear. To see this subset close up, change the X-AXIS PARAMETERS for the NUMBER OF DIVISIONS to 12 (the total number of days in the period), the MAXIMUM X-VALUE to 25 (the X-value of the last point), and the MINIMUM X-VALUE to 13 (one less than the X-value of the first point). Now the screen will be filled with just that two-week period, even though you still have the full months' data in the Apple.

The next two questions are the same as the first, except that they pertain to the second data list. If you're not using the second data list, it's good to leave both of these at their default values of 0. If you are using the second data list, you can use these STARTING POINT and ENDING POINT controls to define a smaller portion of the graph of the second data list just as you did above. The set of displayed points for data list 2 can correspond to that of data list 1, or they can be totally different.

## DATA ENTRY

When you choose DATA ENTRY from the Data Entry Menu, you will be asked about which data list you wish to work on. You can only work on one data list at a time; choose either 1 or 2.

You will then be placed in the Data Editor. The Data Editor has ten commands:

	Enter or change a single data point
S	Enter sequential data points
L	List data points
DX	Delete an entire data point
DX	Delete an X-value
DY	Delete a Y-value
IX	Insert an entire data point
IX	Insert an X-value

IY        Insert a Y-value  
/        Return to menu

The Data Editor works on a single data list, a set of 100 data points. There are three parts to each data point:

- \* The Data Point Number. This is an integer from 1 to 100, inclusive, which is unique to each data point in this data list. When you display the graph, Apple Plot places and connects the data points in the order of their data point numbers. The Data Editor also lists data points in order of their data point numbers.
- \* The X-value. This is a positive real number. If the number has digits to the right of the decimal point, only the first two digits to the right of the decimal point will be displayed.
- \* The Y-value. This is a positive or negative real number. If the number has digits to the right of the decimal point, only the first two digits to the right of the decimal point will be displayed.

These three parts are displayed in separate columns on the screen. The remainder of this section of the manual will show the values of data points in columns, as they might appear on your screen, but headed with the labels #, X, and Y.

## Entering Data

To enter a single new data point, or change the X and Y values of an existing data point, just type the number of the data point, press RETURN, type the X-value of the data point, press RETURN, type the Y-value of the data point, and press RETURN again. Do this for each data point you want to enter. If you make a mistake, just reenter the entire data point.



The Data Editor does not allow you to move backwards across columns by using the Apple's backspace key. You can use the backspace key to correct a mistake in the number you're typing, before you press RETURN; but once you do press RETURN, the only way to fix an error in a data point is to reenter the entire data point.

If you are entering data whose X-values are sequential integers beginning with 1, then you can use the special Sequential Entry feature. For example, if you have a yearly rainfall chart, giving the annual rainfall for a number of years, and you want to enter it into Apple Plot, you can use the Yearly Plot feature of the X-AXIS PARAMETERS in conjunction with the Sequential Entry feature to make entry and display easy. Here's how:



Suppose your rainfall chart gives you the annual rainfall, in inches, for the years 1960 through 1970. The X-values in the data list will indicate the years, and the Y-values will indicate the rainfall amount for those years. The first year, 1960, will be the first data point in the data list, and it'll be called Year 1: its X-value will be 1. The year 1961 will have an X-value of 2, and so on. These values will not change; the X-values will always be in the range from 1 to 11. To associate the year numbers 1 through 11 with the actual years 1960 through 1970, you would use the Yearly plot labels in X-AXIS PARAMETERS (see that section in this chapter.)

Type S1 and press RETURN. You've just set Sequential Entry mode, starting at data point number 1, year number 1. Type the rainfall for year 1 (1960), let's say it's 115 inches. Type 115 and press RETURN. Automatically, Apple Plot has entered this data point as

#	X	Y
1	1	115
2	2	

and now it's waiting for you to type the Y-value for data point 2, which is the rainfall for year 2. Type 98 and press RETURN. You'll see:

#	X	Y
1	1	115
2	2	98
3	3	

All you need to do is type the Y-values; Apple Plot will supply the data point numbers and the X-values for you.

When you run out of data points to enter, type a slash (/) where you would normally enter a Y-value and press RETURN. You'll be back at the Data Editor's command level, and you can continue to edit or examine the data list.

You can use the Sequential entry mode starting with any data point number; for example, to enter data points from number 8 onward, type S8. No other data points will be changed except those numbered 8 through the last one you enter.

## Listing Data

To see a list of the X- and Y-values of data points, type L followed by the number of the first data point which you wish to see, and press RETURN. If you omit the data point number, the list will begin with data point number 1. While the list is being displayed, you can cause it to pause by pressing the spacebar. To continue listing, press the spacebar again. To make the listing stop altogether, press RETURN.

## Deleting Data

To delete an entire data point from the list, type DXY, press RETURN, type the number of the data point which you wish to remove, and press RETURN again. Apple Plot will remove the X and Y values of the data point, leaving a hole in the list of data point values. It will then move up all of the following X and Y values to fill up the hole. For example, if you had a data list like the following:

<u>#</u>	<u>X</u>	<u>Y</u>
1	10	8
2	15	7
3	20	9
4	25	6
5	30	4

and you typed

DXY RETURN 3 RETURN

then the new data list would look like this:

<u>#</u>	<u>X</u>	<u>Y</u>
1	10	8
2	15	7
3	25	6
4	30	4
5	0	0

Apple Plot removed the values 20 and 9 from data point number 3, leaving a hole. It then moved the values 25 and 6 into that hole from data point number 4. Then it moved the values 30 and 4 from data point 5 into data point 4. Finally, having nothing left to use, it put zeroes into the X and Y values of data point 5.

The DX and DY commands for the Data Editor let you delete just one of the values from a data point, leaving the other intact. These commands are valuable when you've made a mistake when entering data and the X- or Y-values are not synchronized. For example, imagine that you were entering data into Apple Plot, copying from a rough, handwritten table, and you had entered the following:

<u>#</u>	<u>X</u>	<u>Y</u>
1	800	3.2
2	820	5.3
3	835	8
4	838	8
5	842	8.5
6	850	8.6

Then you noticed that the Y-value for data point 6 should have been 9, not 8.6. Then you realized that although you had entered all of the X-values correctly, you had accidentally used the Y-value of 8 twice, for data points 3 and 4. The correct Y-value for data point 4 should

be 8.5, the Y-value for point 5 should be 8.6. Type

DY RETURN 4 RETURN

to delete the mistakenly repeated Y-value in data point number 4. The hole left by the removed value will be filled with the Y-value from the next data point, and so on down the line. After you delete the mistaken value, the data list will look like this:

#	X	Y
1	800	3.2
2	820	5.3
3	835	8
4	838	8.5
5	842	8.6
6	850	0

Now change data point 6 to its proper value (by entering the entire data point again), and you can continue entering points.

The DX command works in the same fashion as DY, above, except that it deletes X-values, not Y.

## Inserting Data

The IXY command allows you to insert a data point into the middle of a data list, immediately before another data point. Suppose you have a data list containing days of the month as the X-values and your checking account balance as the Y-values, and you've entered it like this:

#	X	Y
1	8	500.00
2	9	429.35
3	11	419.35
4	12	399.35
5	15	649.35
6	16	638.92
7	17	604.84

After you enter this, you realize you've forgotten the 14th, when you had \$349.35. Since the 14th comes between the 12th and the 15th, this data point should be inserted before data point 5.

Type

IXY RETURN 5 RETURN 14 RETURN 349.35 RETURN

Data point 5 will take on the new values, data point 6 will get the values formerly belonging to point 5, and point 7 will get the values of point 6, and so on. The new data list will look like this:

<u>#</u>	<u>X</u>	<u>Y</u>
1	8	500.00
2	9	429.35
3	11	419.35
4	12	399.35
5	14	349.35
6	15	649.35
7	16	638.92
8	17	604.84

The IX and IY commands insert only a single X or Y value, respectively. These commands are valuable when you've made a mistake when entering data and the X- or Y-values are not synchronized. If you have a data list as follows:

<u>#</u>	<u>X</u>	<u>Y</u>
1	20	5
2	25	7
3	30	9
4	40	11
5	45	13
6	50	15
7	?	17

and you discover that you left out the X value 35, which should have been data point 4 with the Y value of 11, you can insert the missing X value by typing

```
IX RETURN 4 RETURN 35 RETURN 11 RETURN
```

The X-values for data points 4, 5, and 6 will be bumped down to make room for the newcomer, and the Y-value for data point 4 will be replaced with the new Y-value of 11 you entered, but the other Y-values won't be changed. The resulting data list will look like this:

<u>#</u>	<u>X</u>	<u>Y</u>
1	20	5
2	25	7
3	30	9
4	35	11
5	40	13
6	45	15
7	55	17

The IY command operates in entirely the same manner, inserting a Y-value into a data list and replacing an X-value, rather than inserting an X-value and replacing a Y. The IX, DX, IY, and DY commands are also useful not only for correcting mistakes, but also for shifting your data set along an axis. The DX and DY commands will move a graph towards the origin in the X and Y directions, respectively, and the IX and IY commands will move a graph away from the origin. As always, you must be careful to make sure that all data points you're using have valid X and Y values, and that no X or Y value for a data point

is left unassigned. Otherwise, the results are unpredictable.

## LEAVING THE DATA EDITOR

When you wish to leave the Data Editor, type a slash (/) where you normally would enter a data point or type a command and press RETURN. Apple Plot will display the word WAIT flashing at the bottom of the screen while it updates the data list; it will then return to the Data Entry and Editing Menu.

## DISPLAY DATA

When you choose DISPLAY DATA from the Data Entry Menu, you will be asked about which data list you wish to see. You can only see one data list at a time; choose either 1 or 2 and press RETURN.

Apple Plot will start displaying a list of the data points in the chosen data list. The list will begin with data point number 1, and will display the values of all data points, whether you are using them or not. While the list is being displayed, you can cause it to pause by pressing the spacebar. To continue listing, press the spacebar again. To make the listing stop altogether, press RETURN. You will be returned to the Data Entry and Editing menu.

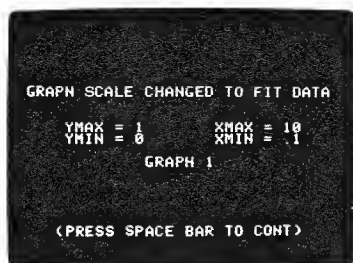
## DISPLAY GRAPH

---

Selection 5 from the Apple Plot menu allows you to display the graph of the data set on which you are working.

First, Apple Plot will scan all of the data points in the plotting range you specified for each data list. It will determine the minimum and maximum X- and Y-values in all the data points you're plotting. If the X- or Y-value of any data point is greater than the maximum (or less than the minimum) X- or Y-value you've set in X- or Y-AXIS PARAMETERS, then Apple Plot will automatically adjust the setting of the proper parameter to ensure that it can plot all of your data

points on the screen. When it does this, it will display a message such as this:



informing you of which parameter was changed, and also its new value. Press the spacebar to continue.

If the OVERLAY ADDITIONAL GRAPHS switch of the GRAPH FORMAT SELECTION is OFF, Apple Plot will then clear the Apple's Page 1 High-Resolution Graphics screen and draw, in this order:

- 1) The X- and Y-axes, at right angles to each other. If both data sets contain only positive values, then the origin will be near the lower-left corner of the screen; if there are negative values in either of the displayed data sets, then the X-axis will bisect the Y and the origin will be near the middle of the left side of the screen.
- 2) Short, horizontal tic marks along the Y-axis. The number of tic marks is determined by the NUMBER OF DIVISIONS setting in the Y-AXIS PARAMETERS. If the EXTENDED HORIZONTAL GRID MARKS are desired, then Apple Plot will draw a series of dots extending horizontally from each tic mark. The dots will fall directly above or directly between the X-axis tic marks.
- 3) Short, vertical tic marks along the X-axis. The number of tic marks is determined by the NUMBER OF DIVISIONS setting in the X-AXIS PARAMETERS. If the EXTENDED VERTICAL GRID MARKS are desired, then Apple Plot will draw a series of dots extending vertically from each tic mark. The dots will fall directly across from or directly between the Y-axis tic marks.
- 4) The label for the Y-axis, with the characters stacked vertically. The label appears on the far left edge of the screen, centered vertically next to the Y-axis.
- 5) The label for the X-axis, drawn horizontally. The label appears at the very bottom of the screen, centered horizontally under the X-axis.
- 6) The title of the graph, drawn horizontally. The title appears at the very top of the screen, centered horizontally above the X-axis.
- 7) Scale marking labels for the Y-axis. These appear as strings

of digits, centered next to the tic marks which they represent. If labels contain digits to the right of the decimal point, only one digit to the right of the point will be displayed.



If a label contains five characters (including the sign or decimal point), then its first character will run into the Y-axis label; if a label contains more than five characters, then that label will not be displayed. This occurs most often when the Y-axis values are too large (over 10,000) or when the values of the tic marks are not whole numbers (when the Y-axis range is not evenly divisible by the number of tic marks).

If the tic marks on the Y-axis are too close together, then Apple Plot will label as many tic marks as it can without causing labels to overlap.

- 8) Scale marking labels for the X-axis. These appear as strings of digits, with the last digit of each string centered under the tic mark which it represents. If a label contains digits to the right of the decimal point, then only one digit to the right of the point will be displayed.

If the tic marks on the X-axis are too close together, then Apple Plot will label as many tic marks as it can without causing labels to overlap.

- 9) The graph of the first data set. For a SCATTER CHART, STANDARD GRAPH, or STANDARD GRAPH WITH GRAPH OVERLAY Apple Plot will plot the selected individual points in the data set (determined by STARTING and ENDING POINT in NUMBER OF DATA POINTS) as small squares. If the graph is not a SCATTER CHART, then Apple Plot will start with the first displayed data point and draw a line from point to point.

If the graph is a BAR CHART, a BAR CHART WITH GRAPH OVERLAY, or a MULTIPLE BAR CHART, Apple Plot will draw a rectangle for each data point. The width of each rectangle will be  $\frac{2}{3}$  the distance between tic marks, and the height of each rectangle will be determined by the Y-value of the data point. These bars will be drawn in a solid color, unless the graph is a BAR CHART WITH GRAPH OVERLAY, in which case the bars will be drawn as open rectangles with colored horizontal hash marks.



Bars on the rightmost tic mark or on the origin will be drawn half width. If you want these bars to appear at their full width, then add another tic mark on the right side of the graph by increasing the MAXIMUM X-AXIS VALUE and NUMBER OF DIVISIONS (or NUMBER OF MONTHS or LAST YEAR TO PLOT).

- 10) The graph of the second data set. For a STANDARD GRAPH, BAR CHART, or a SCATTER CHART, this data set will not be displayed.

If the graph is a STANDARD GRAPH WITH OVERLAY or a BAR CHART WITH GRAPH OVERLAY, then Apple Plot will plot the selected individual points in the data set (determined by the STARTING and ENDING POINT in NUMBER OF DATA POINTS). Apple Plot will then start with the first displayed data point and draw a line from point to point.

If the graph is a MULTIPLE BAR CHART, then Apple Plot will display the second data set as a bar chart, as described above. This bar chart will be drawn in outline, with colored horizontal hash marks.

- 11) Label #1, if it is used. Apple Plot will clear out a rectangle the size of the label, and then write the label horizontally. If you have already positioned the label, and have not changed it since you last displayed the graph, it will appear in its previous position.

If the label is new, or you have changed the text of the label since the last time you displayed the graph, then you must position the label. To do this you use the keys I, J, K, and M on the Apple's keyboard as directional controls. Each time you press a key, the label moves in the direction indicated by that key. The I key moves the label up, the K key moves it right, the J key moves it left, and the M key moves it down. The label moves 20 dot positions each time. Typing CTRL-A changes this increment to 1 dot position. Typing CTRL-S changes the increment back to 20 dots. If a label hits any edge of the screen while you are moving it, it will stop and move no farther in that direction.

When you have positioned the label, press RETURN. Apple Plot will beep to tell you that the label has been fixed. Since positioning a label destroys parts of your graph as you move the label around, it is recommended that you redisplay the graph after you position a label.

- 12) Label #2, if it is used. Apple Plot will clear out a rectangle the size of the label, and then write the label horizontally. If the label has already been positioned, it will appear in its previous position.

If the label is new, or you have changed the text of the label since the last time you displayed the graph, then you must position the label. You position this label in the same manner as you positioned label #1 (see above).

If the OVERLAY ADDITIONAL GRAPHS switch of the GRAPH FORMAT SELECTION



is ON, then Apple Plot will perform only steps 9 through 12 of the above, without erasing the Apple's high-resolution graphics screen. It will, however, perform range checking and adjustment on your data set.

After the graph is complete, it will remain on the screen until you press the spacebar. You will then be returned to the Apple Plot menu.



If Apple Plot can't interpret one of the parameters you have set, or you committed some other subtle sort of error, then Apple Plot may stop in the middle of displaying the graph and return immediately to the Apple Plot menu. If this happens, **SAVE YOUR DATA IMMEDIATELY**. Then re-check your data, your parameters, and your graph format closely. Try changing things around and see if it works. Make sure that the **GRAPH FORMAT SELECTION** is set to plot the correct data sets in the correct formats, that the **PLOTTING RANGE** is as you wish it to be, and that the X- and Y-axis ranges and number of divisions correspond with the X-axis labels and the minimum and maximum values in your data set.

## SAVE DATA FROM DISK

---

There are two forms in which you can save Apple Plot data onto an Apple diskette: pure Data and Picture. When you save Data, you are saving the data points in both data sets, the **GRAPH FORMAT** you have chosen, and all of the **X- and Y-AXIS PARAMETERS** you have specified. When you save data in Picture format, you are saving none of this: all you are saving is the Apple's High-Resolution screen image of the most recently displayed graph.

Data is stored in Apple Disk II text files. The format of these files is discussed in the next chapter. Pictures are stored in binary files as 8,192 byte screen images, starting at memory location 8192 (hexadecimal \$2000). This is the same format as used by most programs which manipulate high-resolution pictures.

When you choose selection 6 from the Apple Plot menu, you will be asked in which of these forms you wish to store your graph. Answer D or P and press RETURN. Apple Plot will then display a catalog of the contents of the diskette in drive 1. If the catalog is longer than the screen can hold, then you will have to press a key to see the remainder of the catalog before proceeding.

If you have two disk drives and you would like to save your data on the diskette in drive 2, then follow the D or P in the previous step with a comma, a D, and the number of the drive which you would like to use. For example, to save Data onto drive 2, you would type D,D2.

Next, Apple Plot will ask you for the name of the file in which you wish to store your data. You can type any valid Apple DOS file name; see your DOS manual for details.

You can save information into a file which already exists, or you can save it in a newly created file. If you try to save data in an extant file, then that file must be of the same type (text or binary) as the data which you are trying to save. When you do save the data, the previous contents of that file are lost and unrecoverable.

If you simply press RETURN when asked for a file name, you will be returned to the Apple Plot menu with your data unsaved but unchanged.

## RECALL DATA FROM DISK

---

You can recall any data set which you have stored on a diskette, in either Data or Picture form. When you recall a Picture file, none of your data or formatting information is altered; when you recall a Data file, the picture of the previous graph is not removed from the high-resolution screen. Thus, if you set the OVERLAY ADDITIONAL GRAPHS switch to ON, you can recall and plot data set on top of data set, as much as you please.

When you choose selection 7 from the Apple Plot menu, you will be asked in which of these forms you wish to recall your data. Type D or P and press RETURN. You will be shown a catalog of the contents of the diskette; if the catalog is longer than the screen is tall, then you will have to press a key to get all of it.

If you have two disk drives and you would like to recall your data from the diskette in drive 2, then follow the D or P in the previous step with a comma, a D, and the number of the drive which you would like to use. For example, to recall a Picture from drive 2, you would type P,D2.

When Apple Plot asks you for a file name, type the name of the file which you wish to recall, exactly as it appeared in the catalog listing, and press RETURN. If you don't want to recall new data, just press RETURN alone and you'll be sent back to the Apple Plot menu, with your current data set and screen picture unchanged.

When you recall a Data file which does not have formatting information (see Chapter 4 of this manual for instructions on how to create these), Apple Plot sets the formatting parameters to their default values (see CLEAR FOR NEW PLOT, below). It then reads through all of the data points and finds the maximum X- and Y-values in the data sets. It uses these to set the maximum axis values in X- and Y-AXIS PARAMETERS. While it is doing this, it displays the message RANGING DATA flashing in the middle of the screen.



If Apple Plot encounters an error or inconsistency when trying to recall data from the diskette, it will beep three times and display **CHECK YOUR INPUT**

and return you to the Apple Plot menu. Perhaps you misspelled the file name, maybe it's the wrong type of file, or the data in it is scrambled. Try it again, making sure that you're doing everything correctly.

## **CLEAR FOR NEW PLOT**

---

This procedure sets all parameters to their original default values and clears both data sets. It takes a few seconds to finish; while it is working, it displays

**CLEARING**

flashing in the center of the screen. Here, section by section, are the default values:

### **DEFAULT VALUES**

#### **GRAPH FORMAT SELECTION:**

Standard Graph with Graph Overlay  
Overlay Additional Graphs: OFF  
Color for plot 1: White  
plot 2: Blue

#### **X-AXIS PARAMETERS:**

Monthly plot: N  
First month: 1  
Number of months: 12  
Yearly plot: N  
Number of first year: '80  
Number of last year: '90  
Number of divisions: 10  
Maximum X-axis value: 1 (or maximum in data set)  
Minimum X-axis value: 0  
X-axis label: X  
Use label #1: N  
Change label #1: N  
Text for label 1: (blank)  
Use label #2: N  
Change label #2: N  
Text for label #2: (blank)  
Extended vertical grid lines: N

#### Y-AXIS PARAMETERS:

Number of divisions: 10  
Maximum Y-value: 1 (or maximum in data set)  
Minimum Y-value: 0  
Y-axis label: Y  
Title of graph: UNFORMATTED GRAPH  
Extended horizontal grid lines: N

#### DATA ENTRY AND EDITING:

##### PLOTTING RANGE:

Starting point for plot 1: 0  
Ending point for plot 1: 0  
Starting point for plot 2: 0  
Ending point for plot 2: 0

##### DATA ENTRY:

All data points, X-value: 0  
All data points, Y-value: 0

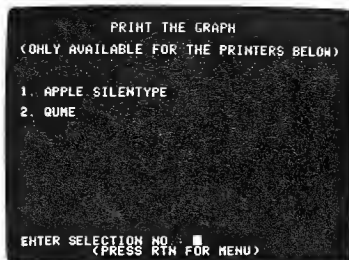
#### DISPLAY GRAPH:

Location of label 1: upper left-hand corner  
Location of label 2: upper left-hand corner

## PRINT THE GRAPH

---

Selection 9 from the Apple Plot menu allows you to get a printed copy of the most recently plotted graph. When you select PRINT THE GRAPH from the Apple Plot menu, you will be shown another menu, called the Print The Graph menu:



You have two choices from this menu: use the Apple Silentype printer, or use a Qume Sprint 5 printer. If you do not wish to print the graph at this time, press RETURN to return to the Apple Plot menu.

## USING THE SILENTYPE

If you wish to use the Apple Silentype printer, its interface card should be plugged into slot 1 of the Apple's backplane. Refer to your Silentype manual for installation and setup instructions.

Make sure that your Silentype is set up properly, and that it is loaded with paper. Press 1 RETURN from the Print The Graph menu to begin printing. If your Silentype interface card is malfunctioning, or you have no Silentype attached to your Apple, Apple Plot will display the message

SILENTYPE NOT IN SYSTEM

Press the spacebar to return to the Apple Plot menu.

If your Silentype is present and operational, then Apple Plot will ask you if you wish to CHANGE PRINTER PARAMETERS? (Y/N). Press RETURN to return to the Apple Plot menu. Press N RETURN to print the graph.

If you answer Y RETURN, then you will be asked four questions about the output parameters for the Silentype. For a thorough description of these paramaters, see your Silentype manual.

The four questions are in a list similar to the X- and Y-AXIS PARAMETERS questions. Pressing RETURN accepts the default reply for a question; typing a slash and pressing RETURN lets you skip the remainder of the questions.

Regardless of whether you changed the parameters or not, you can now press the spacebar to let Apple Plot print your graph. If you press CTRL-C at any time during the printing, Apple Plot will stop, eject the paper, and return you to the Apple Plot menu.

After it has finished printing, the Silentype will eject enough paper for you to be able to tear off the print of the graph, and return you to the Apple Plot menu.

## USING THE QUME

If you wish to use a Qume Sprint 5 printer, then before you select option 2, QUME, from the Print The Graph menu, make sure of the following:

Have an Apple Serial Interface card with a P8A prom plugged into slot 1 inside the Apple. Make sure that your printer is properly initialized. Check that both the printer and the interface card are working at the same baud rate. Verify that the printer is loaded with paper and ribbon. See that the printer cable is firmly connected to the interface card.

Once you've made all these checks, type 1 to select the QUME and press RETURN. The Apple's screen will show your graph, with a blinking bar scanning frantically across it. As the bar zips across the screen, your Qume's print head will fly across the paper, printing black dots as it goes. In less than a minute, your print will be complete, and you will be returned to the Apple Plot menu.

If you do not have a Serial Interface card installed in slot 1 of the Apple, then Apple Plot will display the message

PRINTER CARD NOT FOUND

and return you to the Print The Graph menu.



The QUME printer routine will not work with any printer other than a Qume Sprint 5. It also needs the Apple Serial Interface card with the Letter Quality Prom P8A.



If anything at all goes wrong while Apple Plot is printing your graph, you will have to press RESET and reboot your system. All data will be lost.



If you will be printing many graphs using the Qume, we suggest that you get a printwheel with a reinforced or metallized "period" character. It is with this character and this character only that Apple Plot prints graphs; thus, it is likely to wear out quickly if you print many graphs.

# CHAPTER 4

## GOING FURTHER



This chapter is meant for those of you who may have some experience programming the Apple, and using the Applesoft II BASIC programming language with Apple's Disk Operating System. For more information on the commands and terminology used in the following sections, refer to the Applesoft II BASIC Programming Manual (Apple product number A2L0006) and the DOS manual which was supplied with your disk drive.

### DATA FILE FORMAT

---

An Apple Plot Data file is a sequential-access text file which contains the data point values and formatting information for a data set.

The data is organized into records, which are pieces of information separated by RETURNS. The first record contains the number of data points for the first data list, and the second record contains the number of data points in the second data list. If there are no data points in one of the data lists, then the record which contains the number of data points for that list will be zero.

If there are any data points in the first data list, then their values will occupy the next records. Each data point value is stored with its X-value in one record and its Y-value in the next.

After the last record of the data point values for the first list come the data point values for the second list. These are also stored with each data point's X-value in one record and its Y-value in the next.

Pictorially, the beginning of a data file looks like this:

<u>Record number</u>		<u>Contents</u>
0	+-----+        n	Number of data points in first data list
1	+-----+        m	Number of data points in second data list
2	+-----+       X1	X-value of first data point in data list 1
3	+-----+       Y1	Y-value of first data point in data list 1
4	+-----+       X2	X-value of data point 2, data list 1
5	+-----+       Y2	Y-value of data point 2, data list 1

.	.	.	.
.	.	.	.
2n	Xn	X-value of last data point in data list 1	
	+-----+		
2n+1	Yn	Y-value of last data point in data list 1	
	+-----+		
2n+2	X1	X-value of first data point in data list 2	
	+-----+		
2n+3	Y1	Y-value of first data point in data list 2	
	+-----+		
2n+4	X2	X-value of data point 2 in data list 2	
	+-----+		
2n+5	Y2	Y-value of data point 2 in data list 2	
.	.	.	.
.	.	.	.
.	.	.	.
2(m+n)	Xm	X-value of last data point in data list 2	
	+-----+		
2(m+n)+1	Ym	Y-value of last data point in data list 2	
	+-----+		

In files which were created by Apple Plot, the data point values are followed by the values of all of the X- and Y-axis parameters, the Graph Format parameters, and other variables which control the appearance of the graph. These values are for Apple Plot's use only.

## CREATING YOUR OWN DATA FILES

If you have some output data from a program which you then want to enter into Apple Plot to be graphed, there are two ways to do it: you can run your program, print (or record manually) its output, and then enter it into Apple Plot's Data Editor; or you can have your program create an Apple Plot data file (in the format given above) so that Apple Plot can read it in directly, and you won't need to do any data entry at all. Here's how:

Suppose you've got a program to print the sine and the cosine of numbers from 0 to 6.27, going in 100 steps. It would look like this:

```

NEW
100 REM PROGRAM TO PRINT SINE AND COSINE VALUES
150 REM THERE ARE 100 VALUES, FROM 0 TO 6.28
200 PRINT "VALUE","SINE"
250 FOR X=0 TO 6.27 STEP .0628
300 PRINT X,SIN(X)
350 NEXT X
400 PRINT
450 PRINT "VALUE","COSINE"
500 FOR X=0 TO 6.27 STEP .0628
550 PRINT X,COS(X)
600 NEXT X
650 END

```



This program can be easily modified to send its output not to the screen, but to a text file in a format suitable for Apple Plot.

The first thing it must do is to create the text file. These statements:

```
110 D$=CHR$(4): REM DOS CONTROL CHARACTER
120 REM CREATE THE TEXT FILE FOR OUTPUT
130 PRINT D$;"OPEN SINECOS"
140 PRINT D$;"WRITE SINECOS"
```

do just that. Since there is one set of numbers for the sine, and another for the cosine, let's use Apple Plot's first data list to hold the data points for the sine graph, and its second data list to hold the points for the cosine graph.

The first two items in the file must be the number of data points in each data list. Since there are 100 data points in each list, the statements

```
160 PRINT 100 : REM 100 DATA POINTS IN FIRST LIST
170 PRINT 100 : REM 100 DATA POINTS IN SECOND LIST
```

will place those two numbers at the beginning of the file.

Now the format in which the original program displayed the values of X, SIN(X), and COS(X) must be modified in order to fit Apple Plot's liking. The printed column headers VALUE, SINE, and COSINE are for your benefit only; Apple Plot will choke on them if they are included in its data file. Delete these by typing:

```
DEL 200,200
DEL 400,450
```

Now the PRINT statements in lines 300 and 550 need to be changed. At the moment they will print out the values and their sines and cosines in two columns; Apple Plot wants the sines and cosines on their own lines, immediately following their associated values. Retype these lines:

```
300 PRINT X:PRINT SIN(X)
550 PRINT X:PRINT COS(X)
```

Only one thing left to do: when the program is finished, it should close the file in which it has stored all of the data points:

```
610 PRINT D$;"CLOSE SINECOS"
```

Now this program is finished. You can store it on the diskette, to be modified or added to later, by typing

```
SAVE DATA FILE MAKER
```

Now RUN this program. It should grind along, cranking out sines and cosines for about 25 seconds, with the disk's IN USE light on all the while. When it finishes, there should be a file called SINECOS in your disk's catalog.

Now type

RUN HELLO

to get back into Apple Plot. Select RECALL DATA FROM DISKETTE by typing 7 RETURN. When Apple Plot asks you what type of file you wish to recall, answer D RETURN; when it asks you for the name, type SINECOS.

Apple Plot will then spend a few minutes reading your data file, and another few minutes calculating the minima and maxima of the data points. While it is doing this, it will display the message RANGING DATA

flashing in the middle of the screen. Once it's finished, you can display the graph as you would display any other.

## APPENDIX A

# INTERFACE TO VISICALC™

Apple Plot has the ability to plot the graphs of data sets created by Personal Software's VisiCalc (tm) program. On the Apple Plot diskette is a program which will allow you to convert data files which were created by the VisiCalc program into the format compatible with Apple Plot. For more information on VisiCalc, see your VisiCalc manual.

VisiCalc models are rectangular arrays of numbers, arranged in rows and columns. The conversion program can pick any number of adjacent columns (up to 100) out of any two rows out of a VisiCalc model and convert them into Apple Plot data lists. In order for the conversion program to work, you first must save your VisiCalc model onto diskette.

You will use VisiCalc's /PD command to save a portion of your VisiCalc model onto the diskette. The conversion program will ask you which rows and columns of the portion you saved you wish to convert into Apple Plot data lists. Therefore, you should save a portion of your VisiCalc model which contains the rows and columns you're interested in, and you should remember the position of those rows and columns in the portion you saved. You should also make note of the column width that your VisiCalc model is using; the conversion program needs this information.

Boot your VisiCalc diskette and load your model. Use the arrow keys to position the cursor at the top left corner of the portion of the model you wish to save and type /PD (for PRINT to DISK). When VisiCalc asks you for a file name, type the name of the file into which you wish to store the information (this should not be the same as the file name of your model!). Now either type the coordinates of the lower-right hand corner of the portion you wish to save, or use the arrow keys to move the cursor down to this position. Press RETURN, and VisiCalc will save that portion of your model onto the VisiCalc diskette, into the disk file you specified.

Now boot your Apple Plot diskette, get to the Apple Plot menu, and type Q to Quit, and press ESC. Now type

```
FP
RUN VISICALC FILE CONVERTER
```

From the Conversion Menu, select 1 to INPUT A VISICALC FILE and press RETURN.

You will first be asked the COLUMN WIDTH you had set in VisiCalc. Type the number and press RETURN.

The conversion program will now ask you which row you wish to use for data set number 1. This row number specifies the row in the portion you saved; the top row in the portion you saved is row number 1, the next one is number 2, et cetera. Type the number of the appropriate row and press RETURN.

Next, you'll be asked which row to use for the second data list. If you want only one row, then just press RETURN; otherwise, type the row number and press RETURN.

Now you'll be asked the number of the column which contains the first data point in both data lists. Once again, the column numbers are relative to the first column in the portion you saved; the first column you saved is column number 1, the second is number 2, et cetera. The VisiCalc names for the columns are not used in the conversion program. Type the number of a column in your model and press RETURN.

Next, the program will ask you how many columns you wish to use. The file conversion program will take one data point from each column in the row(s) you specified. Type a number and press RETURN.

Now insert the VisiCalc diskette (on which you saved your model) into the disk drive. The program will ask you which disk drive the disk is in; type the number of the drive and press RETURN.

One more question: you will be asked to verify the above information. If you mistyped anything, type N RETURN; you will be asked the entire list of questions again. If everything's correct, type Y RETURN.

Now the file conversion program will display a catalog of the contents of the diskette in the drive you chose. Type the name of the file in which you stored your VisiCalc model (using the /PD command, above) and press RETURN.

If all of your data was correct, then the program will convert the file, store the result in a file called NAME.X-Y.PLOT (where NAME is the name of the VisiCalc file, X is the number of the first row you chose, and Y is the number of the second row), and you will be returned to the File Conversion menu. Type 2 RETURN to run Apple Plot. Then you can type 7 RETURN to RECALL DATA FROM DISK. Select D RETURN for a Data file; when Apple Plot asks you for a file name, type the name of the file as the conversion program stored it, and press RETURN. Now you're free to display and format the graph as you please.

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